

SYPHILIS OF THE BONES AND SOME RADIO-GRAPHIC FINDINGS.*

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THE earliest writings on *De Morbo Gallico* by Fallopi¹ in the sixteenth century bear witness to the recognition of syphilitic bone affections.

Viewed in the light of an infection, it lay in the nature of the syphilitic malady to look for metastatic deposits in bones, as in other infections. Clinically we have been wont to distinguish between the osseous lesions of hereditary and those of acquired syphilis. Our understanding of the lesions peculiar to either of these will be made clear if we adopt the conception that the bone, as a connective tissue harboring blood-vessels and cells (in the marrow spaces) known as osteoblasts, will react towards any organism as do other connective tissues. Hence it is by way of the blood-vessels that the infectious organism will be propagated. The same holds good for the investing periosteum. Its deeper layer is vascular and its blood-vessels are continuous with those of the Haversian system and the marrow. Therefore, the whole pathological process is always to be regarded as an osteomyelitis either in the marrow or beneath the periosteum, or about the epiphyseal line of ossification. The extent of the process may be diffuse or circumscribed. The specific pathological process may be gummatous, sclerotic, or purulent, or a combination of these; its end results may be the pathologic-physiological conditions of necrosis, osteoporosis, sclerosis, sequestra formation, epiphyseal separation, joint complication with functional disturbance, interference with bone growth, and spontaneous fracture. Physically, the bone is affected and we may speak of osteitis.

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In hereditary syphilis the lesion is located about the epiphyseal ends of the shaft (the ossifying zone of the cartilage). This lesion of osteochondritis, so fully described by Wegner,² Parrot,³ and Taylor⁴ in the seventies of the last century, has in no way up to the present time been enlarged upon, but verified innumerable times. Its essential features are a proliferation and distrophy of the cartilage cells with increased deposit of lime salts, and an irregular extension in the ossifying zones of the marrow spaces. The blood-vessels, few in number, become still further encroached upon by the cells, in consequence of which degenerative changes take place (Waldeyer⁵), resulting in granulation tissue of a low order, causing necrosis, hence epiphyseal separation. Beneath the periosteum there is proliferation and erosion of the underlying bone. In still-born macerated infants of syphilitic parentage, when all the other salient features of the disease are absent, this bone lesion is demonstrable and almost stands out as a pathognomonic of the lethal disease. Furthermore, of recent date is the observation of Betarelli,⁶ who found the *Spirochæta pallida* in three still-born infants in the marrow, beneath the periosteum and in the ossifying zone of the cartilage.

Clinically, even when there is no palpable enlargement of the epiphyseal ends of the bones, the existence of an involvement is revealed by the presence of a palsy of the upper extremity which is titled as the pseudoparalysis of Parrot. It is encountered within the first months of infancy, generally affects the upper extremities, and when unilateral often simulates birth palsy. This latter condition is not painful and may be excluded by the absence of reaction of degeneration. The condition of subluxation of the radius (Streubel, Hutchinson), also spoken of as painful paralysis of young infants (Chais-saignac), following an inadvertent traction of the forearm, may simulate this pseudoparalysis, but the clicking sensation or noise coincident with the replacement of the subluxated radial head restores motion to the lifeless arm even if the pain does not disappear immediately.

At times there is deformity about the epiphysis of the

lower end of the humerus, due to subperiosteal deposits, or that of the radius, and more rarely with epiphyseal separation, increased mobility of the epiphysis may be made out, with or without crepitation. Acute inflammatory signs and suppuration, if they exist, are due to a complicating pyæmic infection emanating perhaps from the umbilicus, perhaps from an infected circumcision, or of gonorrhœal origin.

In the lower extremities, in the presence of the osteochondritis, in contradistinction to the palsy of the upper extremity, the limbs are held in a contracted position.

Nor is this osteochondritis limited to the long bones. It occurs rarely in the metacarpal bones and the phalanges and is familiar to us from the writings of Bulkley⁷ and Taylor as dactylitis syphilitica. One, more, or all the long bones of each hand may be affected. These spindle-shaped swellings are very tender, and, owing to the process of rarefaction of bone in the interior, the cortex may be easily indented (*spina ventosa*), giving rise to the crackling sensation of parchment or eggshells, or the bone is very much thickened. Where one bone, as an isolated lesion of hereditary syphilis, is affected, there is great difficulty of its differentiation from tuberculous dactylitis. Where many phalanges are affected there is a possibility of confounding the condition with rachitis. Quite common is the syphilitic onychia, and in later hereditary syphilis, the saddle-nose and perforation of the hard palate.

Where doubt is entertained as to the nature of the lesion it has been shown by Kienböck and Hocksinger,⁸ of Vienna, that the X-rays give a definite picture. The epiphyseal ends of the diaphysis (not the epiphysis) are enlarged and translucent and the periosteum is very much thickened. In tuberculosis, on the contrary, there is never any periosteal reaction; there is always a great deal of involvement of the soft parts, and the cortical layer of the bone is never of that density peculiar to syphilis. The bone is not translucent, but rather porous. In rachitis, where the pathological changes are also most active at the epiphyseal line, the X-ray generally shows a cup-shaped defect of the diaphyseal parts.

In the later forms of hereditary syphilis other parts of the skeleton may become affected; and there we have to deal with an osteomyelitis of the shaft in the form of a central gummata, sclerosis of the bones with deformities resulting in "sabre en lames" and osteitis deformans. Often the long bones are the seat of spontaneous fractures.

In passing I wish to say that the healing of these fractured bones may not at all be retarded even without treatment, and the same holds good for the bones of syphilitic infants fractured inter-partum, whether dependent on diseased bone or not, as I have seen on two occasions.

In acquired syphilis, contrary to prevailing belief, bone involvement is present even at the time of early secondary manifestations, and nodes of smaller size on the head, ribs, and sternum are often encountered. These syphilitic deposits as expressed by Manriac⁹ are the analogue of the adenopathy; they are transient and have nothing in common with the later gummatous deposits.

In the tertiary period true gummatous deposits are encountered in the marrow and beneath the periosteum of the long bones and in the bones of the skull, and it is the opinion of Lewin and Eschle that the pathological changes are most marked about the blood-vessels. Gummatous deposits in the marrow may be very small and overlooked *intra vitam* as responsible for the osteitic pains in syphilitics. Thus Chiari¹⁰ found in 27 syphilitic cadavers, 9 cases of gummata in the long bones. The larger gummatous deposits of the flat bones, sternum, clavicle, skull, and shafts of the long bones are more readily recognized, and yet there is the possibility of confounding them, where corroborative evidence of syphilis is wanting, with tuberculosis, blastomycetes, sarcoma, and actinomycosis.

Tuberculosis of the shaft is secondary to an extension from the epiphysis; the finding of the tubercle bacillus will dissipate all doubt. The use of tuberculin is unavailing, for Billroth has pointed out that in syphilis and actinomycosis a typical reaction can also be obtained. In the very rare instances where the blastomyces forms subperiosteal swellings,

microscopic examination will show the presence of blastomycetes. Sarcomata and likewise the ray fungus may be found—nevertheless the last resort to the microscope may even be unavailing. However, the X-rays have become the final arbiters for all of these, and the independent observations of Albers-Schönberg (Hamburg), Hahn,¹¹ Kohler (Wiesbaden),¹² and Ritter¹³ have resulted in giving us an analysis of the Röntgenograms of syphilitic bone affections which coincides in most respects and harmonizes with the pathological findings. They regard as typical the dense shadows formed by the periosteum and the corticalis, amounting at times to the obliteration of the medullary cavities. In other parts there are areas of translucency due to absorption of the bone. It is this participation of the periosteum which guards against its confusion with neoplasm, for the latter causes absorption of the bone and causes very abrupt termination of bone limits and no shadow formations due to proliferation.

The following radiograms tend to confirm the findings of these aforementioned authorities.

Figs. 1 and 2 represent the anteroposterior and lateral views of radiograms of a syphilitic arthritis of the elbow. The patient has for many years been under the care of Dr. B. Lapowski. This bone affection has resulted notwithstanding persistent antiluetic treatment with injections of soluble and insoluble mercury salts. The lower end of the humerus, increased in size, presents a thickening of the corticalis to the extent that the medulla is obliterated. There are three areas of absorption which are surrounded by thickened bone.

In Fig. 3, from the same patient, the middle third of the ulna shows an obliteration of the medulla which is replaced by thickened corticalis. A few areas of absorption surrounded by thickened bone can be made out also. In the middle third of the radius, whereas the corticalis and medulla are normal, there is clearly to be seen a subperiosteal deposit and a bowing of the shaft due to an increase of its length (Fournier).

Fig. 4, from the same patient, is a radiograph taken at the site of a very tender area of the lower third of the tibia, corre-

sponding to which there is to be seen a thickening of the corticalis at this level.

Fig. 5 was a radiograph obtained from a female, æt. 28, who, besides her dactylitis, had a subperiosteal gummata of the os frontis. Though married four years she has borne no children, but has aborted several times. The radiograph of the dactylitis shows an increase in the corticalis in the entire extent, amounting to an obliteration of the medulla in the centre. The epiphyseal end of the shaft—not the epiphysis—shows an area of absorption. The soft parts are not involved.

In tuberculosis there is translucency due to absorption and atrophy of the bones; at times small sequestra, but never any increase in the shadow due to bone proliferation, nor thickening of the periosteum.

Fig. 6 is the radiogram of a girl 8 years of age, concerning whom no specific history was to be elicited. Contrary to the X-ray findings, she was subjected to an operation for the marked swelling of the soft parts. Examination of a section removed revealed the existence of gummatous deposit.

This radiogram shows the periosteum of the ulna thickened and lifted up by a gummatous deposit. The corticalis is increased in thickness and encroaches upon the marrow. The ulna is curved because of the greater increase in growth of the bone length in the continuity of the shaft than at either end (Fournier), and the medulla in the centre of the radius is encroached upon by the thickening of the corticalis.

These radiographic findings harmonize with the pathology, for in the subperiosteal gummata we can define a central area of softening surrounded in the periphery by a zone of thickening due to proliferation beneath the periosteum. These gummata may perforate spontaneously and discharge by a minute sinus, which latter again serves (König) to distinguish it from the larger, fistulous openings of tuberculosis. Before the advent of any accessory infection the fluid discharged may be mucilaginous and cheesy; later it is purulent, and when healing is complete we have the cicatrices adherent to the underlying bone which are also peculiar to syphilis.

FIG. 1.



Syphilitic Arthritis of the elbow. Arteriosclerosis obliteration of Medulla-Gumma
in shaft. Erosion on surface.

FIG. 2.



Lower end of humerus shows areas of absorption surrounded by areas of ossification.

FIG. 3.



Ulna—spindle shaped. Gamma rays higher area surrounded by denser darker areas of bone. Medulla obliterated. Radius—shows a subperiosteal deposit and bowing of bone. (Furnier.)

FIG. 4.



Thickening of the corticalis of the lower $\frac{1}{2}$ of the tibia (A).

FIG. 5.



Syphilitic Dactylitis. Thickening of corticalis. Absorption of the head of the metacarpus.

FIG. 4.



Ulna is bowed (Fournier). The corticalis thickened encroaches on medulla. The periostum thickened is lifted up from the underlying bone by a gummatous deposit. The corticalis of radius is thickened at its center.

Syphilis involving the joints is secondary to extension from the epiphyses; and the greater participation of certain joints, particularly the elbow joint, in the process, has been attributed to the fact that the juxta-epiphyseal line of cartilage is intra-articular, whereas in other bones much of the epiphysis and diaphysis is extra-articular. There is, however, a pure synovial type of syphilis, which can only be diagnosed by exclusion, and gummatous deposits may be situated in the capsule and the bursa about these joints.

As far as the X-ray examination is concerned we note an identity in the bone findings of congenital and acquired syphilis which is not encountered in other bone lesions.

Caries sieca and craniotabes of rare occurrence have been omitted, for the authorities differ as to their common cause. Virchow claims caries sieca to be syphilitic; Koenig assigns tuberculosis as the cause. Parrot and Taylor regard craniotabes as syphilitic. Future X-ray examinations will no doubt offer a solution of this problem.

LITERATURE.

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